AFIT/GMO/LAL/97Y-10

AN OPERATIONAL LOOK AT THE ISSUES INVOLVED IN THE DECISION BETWEEN MILITARY AND CIVILIAN AIRLIFT OPTIONS

GRADUATE RESEARCH PAPER

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GRADUATE RESEARCH PAPER

Presented to the Faculty of the Graduate School of

Logistics and Acquisition Management of the

Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the

Requirements for the Degree of

Master of Air Mobility

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May 1997

Acknowledgments

I need to acknowledge a few individuals without whose support and help I would have never completed this paper. I would first like to thank my advisor, Dr. William A. Cunningham, for all of his insight and patience during the course of writing this research paper. He provided the necessary focus and guidance while giving me the freedom to proceed at my own pace. I would also like to thank Captain Kevin Moore for the extra time he spent to help with this paper.

I thank Dr. Matthews and his staff at USTRANSCOM's Research Center for their help in guiding me through the large volume of documents needed to complete my research. I also thank the personnel in the Mobility Operations Branch of the Air Mobility Warfare Center for providing numerous reference materials that helped in the completion of this paper.

Most importantly though, I would like to thank my wife, Brenda, and my son, Ryan, for their support and understanding throughout the entire research process. The long hours, stressful days, and time away from home kept me away from my family "quality time" too many times to count. However, their love and patience was essential to ensure my success in completing both this work and the ASAM program as a whole.

Christopher J. O'Dell

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Abstract

Ever since the early days of flying, aerial transportation has been critical to the successful resupplying of troops. Over time, as aircraft became more advanced, so did the capabilities of airlift and the civil/military relationship. With shrinking defense budgets and the move from the policy of forward presence to the current global engagement, airlift has become increasingly relied upon to rapidly deploy forces around the world. Therefore, the use of both civil and military resources to satisfy the demand for airlift must be adequately planned.

There are a number of factors which affect the planning decisions on a day-to-day basis and the sensitivity of planning to these factors makes this a very challenging task. This paper begins with a historical overview of the relationship between civilian and military structures. It will then discuss the planning factors as they apply to the daily decisions made in utilizing civilian and military airlift assets. Following that are some additional issues concerning the utilization of CRAF aircraft in a contingency environment. It concludes with a look into the future and some issues that will continue to affect planning decisions.

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I. Introduction

Background

Ever since 1908, when the first passenger rode on the Wright Flyer, to the present era of numerous humanitarian and contingency operations, aerial transportation has provided support to troops where it was needed. However, in the early days of military aviation, airlift was not given as much attention as other forms of air power. The fascination with waves of bombers and fighters left little room for thoughts of moving people or cargo to support military operations. Consequently, the development of the military airlift system and the aircraft to maintain it took some time to evolve.

The civilian sector, however, approached airlift with much greater enthusiasm. The Kelly Act, which was the first airmail statute, called for commercial contracts to supplement the Post Office's own transcontinental service. Therefore, it was the first national policy to promote commercial aviation (Priddy, 1993: 3). Creation of a network of airways and improvements in aircraft designs led to the expansion of commercial passenger service.

In 1934, the government wanted to examine the relationship between military and civil aviation so they formed the Baker Board. They were very impressed with the developments in civil aviation and believed some of the aircraft should be used as a transport and cargo reserve for national defense purposes. They went on to recommend a close relationship between military and civilian aviation to "familiarize the Air Corps with the latest developments in use in commercial air transport" (Miller, 1988:6).

This relationship would come to fruition during World War II and in operations that would occur after the war. Additionally, the importance of airlift, especially to the military, was starting to take hold. Flying over the Himalayas (known as "the Hump" airlift), the Berlin Airlift, support of troops in Korea and Vietnam, operations in Grenada and Panama, Desert Shield and Storm, and several humanitarian missions have solidified airlift as a critical part of national military strategy.

Equally important to this relationship was the creation of the Civil Reserve Air Fleet (CRAF) in 1951. The purpose of the CRAF is to augment military airlift to ensure sufficient capability exists in the event of contingencies or wars. It continues to be an extremely important part of the airlift planning process. Nowhere was this more evident than during operations in the Persian Gulf region.

The current airlift policy has its foundations in the plan that General Ronald Fogelman calls "Global Engagement: A Vision for the 21st Century Air Force" (Fogelman, Washington DC, 1996). It is composed of six core competencies: Air and Space Superiority, Global Attack, Rapid Global Mobility, Precision Engagement,

Information Superiority, and Agile Combat Support. Together these competencies should enable the Air Force to meet the challenges of the future.

General Issue

The end of the Cold War brought about numerous changes to the global environment and especially the Air Force. With defense budgets shrinking and the number of troops stationed overseas decreasing, airlift is becoming increasingly relied upon to rapidly deploy U.S.-based equipment and personnel, as well as forces of other services and countries, to the numerous areas around the world where they are in demand. Rapid Global Mobility, one of the Air Force's six core competencies, provides the capability to respond to these events. General Fogelman describes it as "bringing forces forward for a full range of operations, from combat to peacekeeping or humanitarian efforts" (Fogelman, Washington DC, 1996). The effective use of both civilian and military airlift is necessary to ensure the most efficient means to accomplish these missions.

Inherent in this process is the daunting task of planning for all of the required airlift. The sensitivity of airlift planning to various factors makes this a very challenging proposition. Even minor changes in factors such as time, distance, payload, or infrastructure could significantly affect the amount of airlift required. Therefore, it is very important to understand the issues that drive the decision to use civilian or military airlift.

This paper will examine these issues as they pertain to the selection process involving the appropriate choice of civilian and/or military airlift. Specifically, the paper will look at the issues that affect strategic airlift decisions, not theater airlift ones. As of 1 April 1997, the C-130s will return under the control of Air Mobility Command (AMC). Their place in the strategic airlift picture will certainly evolve over time, so we will just have to take a wait-and-see approach.

Finally, this paper will serve as a single-source document to any party interested in the facets of airlift planning. Numerous articles and papers have been written from a strategic perspective, but this paper will take an operational look at airlift - the day-to-day issues that affect the decisions between civilian and military airlift.

Research Questions

To properly understand how the airlift decisions should occur, the following research questions will be discussed:

1. How has the relationship between civilian and military airlift developed?
2. What should the planning considerations be?
3. Do issues differ for peacetime and contingency planning?

Overview of Subsequent Chapters

Chapter II looks at the historical development of airlift as a critical facet of national strategy, from both the civilian and military perspectives. It will focus on the relationship between civil and military aviation and how that has grown into the current dependence that each one has on the other for their survival.

Chapter III discusses the myriad of day-to-day planning considerations involved in selecting the appropriate airlift for a given tasking or requirement. Specifically, it will cover peacetime issues.

Chapter IV includes planning considerations that are different for utilizing CRAF resources, mainly in a contingency environment, and how they affect the airlift decision.

Chapter V includes a summary of the information provided in this paper as well as some future considerations that could affect airlift decisions into the 21st century.

II. History of Airlift

"Any nation in building an air force cannot think of its fighting planes alone. This air transport service for troops, supplies, and ambulances and medical service, and for the transport of artillery and heavy equipment is a necessary adjunct to the maintenance of any efficient fighting force in the field. The speed and range of modern mechanized forces makes it distinctly advisable that at least a portion of their supply columns and agencies travel through the air."

- General "Hap" H. Arnold (1941)
Commander of Army Air Forces, WW II

The resupplying of troops has been critical to the success or failure of the many military operations throughout history. Both unfriendly opponents and difficult terrain have attempted to curb these resupply efforts. The appearance of manned hot air balloons in the late 1800s gave rise to thoughts of using aerial transport to overcome these obstacles. However, it was the advent of the airplane that shone new light on this aerial transportation issue and began the relationship between civilian and military structures.

The Pre World War II Era

Prior to World War I, the military provided the majority of the funding for aircraft testing and development. When the U.S. finally entered the war, they found out how important these aircraft could be and they started shaping the role these planes would play in warfare. Initially, the Army Signal Corps began transporting personnel, cargo, and patients. In February of 1918, Major Nelson E. Driver, a medical officer, and Captain

William C. Ocker, Commander of Flight Training at Gerstner Field, Louisiana, modified a JN-4 Jenny to accommodate patient transport (MAC Office of History, 1991:1). This led to further modifications of other aircraft in order to continue this critical mission. Additionally, transporting troops and high-ranking officials and the resupply of combat forces were both initiated during this time period. The end of the war saw the creation of the Army Air Service as a combatant arm of the Army (Miller, 1988:2).

The 1920s and 1930s witnessed the development of commercial aviation and technological improvements in aircraft design, particularly in transport aircraft. The Douglas DC-2 and Boeing 247 increased cargo and personnel capacity. In 1926, Congress reorganized the Army Air Service into the Army Air Corps and they immediately set out to prove the effectiveness of supplying and sustaining combat troops by air. Even though several training maneuvers were successful, inadequate funding forced the Air Corps to focus most of their efforts on combat forces.

In the mid-1930s, the Baker Board, named after the former Secretary of War, was formed to survey the Air Corps as an agency of national defense and to examine the relationship between civilian and Army aviation. They were very impressed with the improvements in civil aviation:

> One of the most important recent developments in civil aviation is the production of the high speed, large capacity passenger and cargo air transport. This type of airplane with certain structural changes in its design can be so constructed as to be adapted for military use...there should be a very close liaison between civil and military aviation, but the control of the two systems...must be separate and distinct. (Miller, 1988:5-6)

The chief of the Air Corps, Major General Benjamin Foulois, took exception to these conclusions because of the inherent differences between military and commercial

transports. Specifically, he knew that commercial aircraft were designed for passengers, not bulky loads, and needed to operate from larger airfields. He likened the comparison to that of a passenger car and a cargo truck. He stated that "while it is true that the passenger automobile can carry a certain amount of freight, true economy demands the use of a cargo truck for such purposes" (Miller, 1988:7). These differences continue even today.

As the 1930s were coming to a close, the Army, specifically Brigadier General "Hap" Arnold, continued to press for more transport aircraft. However, the new Secretary of War, Harry Woodring, did not agree. He said in 1937 that he saw no reason "for buying any transports due to their high price" (MAC Office of History, 1991:10). The money saved would be used to buy new bombers instead. Transport requirements were supposed to be met by converting old bombers. Driven by increased tensions in Europe, President Roosevelt would reverse this lack of vision by the end of the decade.

As Germany swept through Europe with relative ease, Britain would be faced with the task of trying to stop their advances. President Roosevelt would help them by passing the Lend-Lease Act in March 1941. The British requested so many aircraft that the Army was required to deliver them. Consequently, they formed the Air Corp Ferrying Command (ACFC) to execute this responsibility. Eventually, the ACFC would be flying all over the world. The knowledge and flying skills gained during this time would prove to be extremely beneficial for both commercial and military transport in the years that followed. The importance of airlift would become readily apparent during World War II.

World War II, the Hump, and the Berlin Airlift

The bombing of Pearl Harbor and our subsequent entry into the war increased the tempo and scope of the ACFC's responsibilities. On 13 December 1941, President Roosevelt signed an executive order directing the Secretary of War to take possession of any civilian airline needed for the war effort. Accordingly, numerous civilian transports became part of ACFC's operations (Priddy, 1993:6).

June of 1942 would be a landmark month in the history of airlift. General Arnold, believing that the Army Air Forces should use military operators for transport operations rather than civilians under contract, created both the Air Transport Command (ATC) and Troop Carrier Command. The ATC's responsibilities included what we now refer to as strategic airlift: ferrying aircraft within and outside the U.S., transporting personnel, material, and mail, and the control of maintenance outside the U.S. Additionally, they contracted with civil air carriers to provide transportation services. In 1942, civilian airlines provided nearly 87 percent of the cargo but by 1945, this dropped to 22 percent (Miller, 1988:35). Troop Carrier Command, on the other hand, focused on airlift support within the theaters of operation.

The increasing demand for transport services during the war forced ATC to expand its route structure and its operations. New wings were formed wherever they were needed to support the war effort. Alaska, Europe, Pacific, and India-China are only of few of the wings that arose from this necessity. Training was initially performed by the civil air carriers until the military built up its air transportation expertise. The

expansion of ATC also led to the much needed acquisition of aircraft, with the DC-3 comprising over 40 percent of the total aircraft inventory.

The war eventually provided ATC with its largest transport operation and the first great airlift in history - "the Hump." General Fogelman expressed the importance of this when he said "Air transportation first came into its own during World War II. Nowhere was this more evident than in the China-Burma-India theater of warfare" (Fogelman, Orlando, 1993). This airlift provided a supply lifeline from northeast India across the Himalayas to aid the Chinese in their resistance against the Japanese. The initial stages of the airlift were marred by insufficient tonnage being airlifted and an excessive accident rate. To fix these problems, General William H. Tunner was given command of the India-China Division.

General Tunner, a true pioneer of airlift, immediately sought to improve the airlift system. As a first step, he increased the size of the operation with both added personnel and aircraft. He also instituted a comprehensive safety program. In his book Over the Hump, General Tunner described the extensive investigation that went into understanding what caused every accident, from weather and communications, to pilot discipline, maintenance, and health and morale (Tunner, 1964:103). The results of his efforts were remarkable. By August of 1945, the accident rate had decreased by 55 percent (MAC Office of History, 1991:41). His introduction of product line maintenance (PLM) improved mission-ready rates to 85 percent and maintenance down time decreased 25 percent (Miller, 1988:55). Furthermore, tonnage nearly doubled by July of 1945 and only decreased because August saw the end of the war. A former ATC historian would later

say that "the Air Transport Command's crowded airways to China were the proving ground, if not the birthplace, of mass strategic airlift...in military and civilian circles alike men were forced to modify their thinking regarding the potential of airlift" (Miller, 1988:57).

The lessons of the war had proven the importance of airlift as well as the unique benefits from the interrelationship between civilian and military transport assets. It was time to formulate a national aviation policy, so the Finletter Commission was appointed to serve this purpose. They recommended that the commercial airlines augment any airlift shortfalls the military might experience in future operations. Furthermore, they said a contractual relationship should be developed between the military and commercial airlines and it should be called the Civil Reserve Air Fleet (it was formally adopted years later). They also recommended the consolidation of both ATC and the Naval Air Transport Service (NATS) into a single military air transport service (Priddy, 1993:10).

The new Secretary of Defense, James V. Forrestal, acted on this final recommendation by unifying ATC and NATS on May of 1948 into the Military Air Transport Service (MATS). It was responsible for managing all strategic airlift operations for the Department of Defense (DOD). No sooner had MATS been formed than a crisis arose in Berlin.

In June of 1948, the Soviet Union, upset over Allied involvement in a proposed West German state, blocked access to Berlin in the eastern zone. They essentially cut off all food, supplies, and fuel to the residents of West Berlin. Once again, the opportunity arose for airlift to flex its muscles. The Berlin Airlift, also called Operation VITTLES,

was started with two purposes in mind: to provide supplies to the people of West Berlin and to hopefully break the blockade. General Tunner, now a proven airlift expert, was called in to run the operation. He believed that "If the Berlin Airlift was to be successful...then it would be more than just an airlift. It would be a propaganda weapon held up before the whole world" (Tunner, 1964:180). Air Force Magazine echoed this sentiment in September of 1948 by pointing out that "For the first time in history, the United States is employing its Air Force as a diplomatic weapon" (Fogelman, Orlando, 1993).

The airlift lasted from 26 June 1948 until 1 August 1949. The pinnacle occurred on 16 April 1949 with the "Easter Parade". Within a 24 hour period, 12,941 tons of cargo were delivered and 1,398 flights took place with no accidents or injuries (MAC Office of History, 1991:71). The final tally was 266,600 flights delivering more than 2,223,000 tons of cargo and demonstrating that airlift was indeed a key factor on the international and military scenes (Miller, 1988:175).

The Civil Reserve Air Fleet

One of the lessons learned during both World War II and the Korean War was that the military did not have enough airlift capacity to respond to its wartime requirements. Therefore, it was necessary to augment the airlift with commercial assets. Based upon the recommendations of the Finletter Commission (as stated above) and the subsequent Douglas Committee, which discussed dividing the civilian airlines into First and Second

Line Reserves, this airlift deficiency would provide the foundation for the Civil Reserve Air Fleet (CRAF).

On 2 March 1951, President Truman signed Executive Order 10219 which called for a program to formalize agreements between DOD and the airlines for using commercial aircraft during contingencies and gave the responsibility of developing this program to the Secretaries of Commerce and Defense (Chenoweth, 1990:2). The two agencies signed a Memorandum of Understanding (MOU) in 1952 and the CRAF was established with the MATS commander given the responsibility of managing the CRAF program.

The CRAF is a voluntary, contractual program that is designed to augment U.S. military forces with civil air carrier resources to support DOD airlift requirements during periods of increased airlift activity. In return for their participation, the air carriers are offered a portion of the military's international air transport business. Fully activated, it is expected to provide nearly 93 percent of passenger capability and 32 percent of the cargo capability (Van Horn, 1997).

The CRAF provides two distinct economic advantages. First, the military can use aircraft and key personnel during war that someone else has paid for, maintained, and trained during peacetime (Chenoweth, 1990:3). Second, the government only pays for the services it actually uses.

Over the years, there were to be numerous changes to the structure and implementation of the CRAF and these will be discussed later in this paper as appropriate.

The Role of MATS in Peace and War

The 1950s were a turbulent period in the airlift business. Both MATS and civilian carriers were fighting for their piece of the airlift pie. The recommendations made by the Hoover Commission in 1955 seemed to side with the airlines:

> MATS peacetime operations should be restricted and carefully evaluated as to the necessity of military transportation and, only after commercial carriers have been utilized to the maximum practicable extent, should transportation on MATS aircraft be permitted. (Priddy, 1993:18)

Further reviews of the role of the military in peacetime airlift activities continued throughout the decade. One such review was made by the Holifield Committee, who looked at the role of both MATS and the civil air industry in national defense and their relationship with one another. This committee recommended that vigorous steps be taken to modernize the MATS fleet by acquiring "new, large, long-range aircraft of the most modern types as a nucleus for defense capability" (Miller, 1988:247). The C-141 was one of the results. The committee further recommended that MATS limit its airlift activities to outsized and special cargo, while the commercial carriers would transport passengers and conventional cargo in exchange for CRAF participation (Priddy, 1993:22). One last recommendation, that would surface a few years later, was that the President direct a new study of civil air policy.

Based on the recommendations of the Holifield Committee, President Eisenhower directed the Secretary of Defense to study the role of MATS in peace and war. After a year and a half, the result was a report called "The Role of Military Air Transport Service in Peace and War." This February 1960 document contained nine Presidentially

Approved Courses of Action that would serve as a foundation for national airlift policy in the future.

Some of the highlights of the report follow. First, the President mandated that MATS be equipped and operated in peacetime to ensure its ability to meet "hard-core" military requirements that could not be effectively met by U.S. commercial carriers. These hard-core requirements were defined as those which "must move in military aircraft, manned and operated by military crews because of special military considerations, security, or because of limiting physical characteristics such as size or dangerous properties" (DOD Report, 1960). Second, routine cargo and passenger traffic would go to the commercial carriers consistent with the economical use of the MATS fleet and considering the need for training. Third, commercial carriers are encouraged to acquire long-range cargo aircraft to help DOD. Additionally, DOD would give preference to those carriers committed to the CRAF; shown by demonstrating their "willingness and ability to acquire uncompromised aircraft" and whose "facilities and equipment are most advantageous to the emergency needs of the Department of Defense" (DOD Report, 1960). Fourth, because MATS needed long-range aircraft, both the DOD and civilian industry should share in the costs of the development of the aircraft. Finally, the role of CRAF should be periodically re-examined to ensure "optimum effectiveness and responsiveness of commercial airlift services to the Department of Defense under all conditions" (DOD Report, 1960).

"The Role of MATS in Peace and War" remains the single most important document in the CRAF's history. It served as the blueprint for the DOD to take actions

affecting the relationship between the commercial air carrier industry and the CRAF program for the next thirty years (Priddy, 1993:28).

The Vietnam Era

This period in airlift's history was concerned less about actual airlift and more about doctrinal and structural changes that would shape airlift issues even to the present day. By 1964, when MATS became heavily involved in the war, there was a great deal of concern about the age and capability of the airlift fleet. Certainly the new C-141 was a step in the right direction, but as President Johnson said to Congress in 1965:

> We must further improve our ability to concentrate our power rapidly in a threatened area so as to halt aggression early and swiftly. To this end, we will start development of the C-5A cargo transport...it will represent a dramatic step in the worldwide mobility of our forces and in American leadership in the field of aviation. (Miller, 1988:305)

When the demand for airlift continued to increase, MATS called upon the Air National Guard, the Air Force Reserve, and, once again, commercial airlines. Because the CRAF had not been activated, MATS used voluntary contract leasing of commercial aircraft. By 1968, commercial airlines were handling 91 percent of the passengers and 24 percent of the cargo (MAC Office of History, 1991:124).

Once the capacity increased though, another problem reared its ugly head - inadequate infrastructure. General Curtis LeMay remarked "there is no effective airlift system" (Miller, 1988:311). The number of aerial port facilities was insufficient and command and control was very poor. In response, the U.S. began a huge construction program, renovating airfields and as well as building new ones. New passenger terminals

were built in the Pacific theater to relieve pressure in the Philippines. Additionally, the aerial port system was reorganized and given automated terminals. Command and control in theater would be assisted by deployed airlift control elements (ALCE).

Another change during this period was the renaming of MATS to Military Airlift Command (MAC) in January of 1966; years later it would become a specified command. This name would last for a quarter of a century. Their primary mission during Vietnam was strategic delivery of personnel and cargo, but they also flew some intratheater (tactical) missions. In fact, tactical airlift operations grew immensely in scope and importance throughout the war with the C-130s handling the lion's share of the workload.

Doctrinally, the lines between strategic and tactical airlift began to blur in Southeast Asia. "Strategic" aircraft, such as the C-141 and C-5, would fly into combat areas, while the "tactical" C-130s often flew strategic missions. Project CORONA HARVEST, the official Air Force study of the Vietnam War, noted this and recommended that both strategic and tactical airlift forces be combined under a single command.

The Vietnam era challenged the traditional airlift roles and the resources used to carry out the mission. Intratheater airlift grew in importance, the Guard, Reserve, and commercial industry were used extensively, the infrastructure was dramatically upgraded, and jet aircraft designed specifically for airlift proved invaluable.

The Modern Airlift Era

The years following the Vietnam War witnessed numerous examples of airlift's potential. The repatriation of prisoners of war from Vietnam, the evacuation of refugees from Saigon, airlift to Israel during the Yom Kippur War, and several humanitarian operations throughout the world, all served notice that airlift was invaluable in accomplishing national policy objectives. The lessons learned from these led to the consolidation of tactical and strategic airlift under MAC and they became a specified command.

The 1980s began with problems in the Middle East and a continuing Soviet military build-up in Europe. Once again, the military faced the issue of determining how much airlift is actually required to respond to worldwide contingencies. As a result, the Defense Department published the Congressionally Mandated Mobility Study (CMMS) in April 1981. It was intended to determine the proper mix of airlift, sealift, and prepositioning resources needed by looking at four scenarios in the European and Middle Eastern theaters. It was concluded that the minimum goal for airlift capability, which was fiscally constrained, should be at least 66 million ton-miles per day (MTM/D). This capability was to be met by a combination of military and CRAF aircraft. Unfortunately, the airlift resources available at that time fell well short of this goal. Steps taken to improve the airlift shortfall included upgrading current aircraft by "stretching" the C-141, acquiring new aircraft, such as the KC-10 and C-5B, and utilizing the CRAF Enhancement Program, which involved DOD-funded modifications on civilian wide-body aircraft.

These were really only immediate fixes and did not adequately address the long-term shortfalls in total airlift capability. General Block, director of the C-X Task Force, said "The bottom line is that we need inter- as well as intratheater airlift aircraft with an outsize capability that can operate into a small, austere field" (Miller, 1988:392). After endless debate and testing, the acquisition of the C-17 was selected to fill this need. One of its primary strengths was that it had direct delivery capability - delivering combat forces as close as possible to the battle.

A more recent study of airlift capabilities was the Mobility Requirements Study Bottom-Up Review Update (MRS BURU). This analysis is based on the nearly two simultaneous Major Regional Contingencies (MRC) scenario. The result was an airlift requirement reduce to 49.7 MTM/D as a basis for force structure planning (AMMP, 1997:1-26). Although MRS BURU is presently being reviewed, it is still the most current study in effect.

This era also saw a redefining of the relationship between DOD and civil air carriers. Since "The Role of MATS in Peace and War" was over twenty years old and MATS no longer existed, a new national airlift policy was needed. In July of 1987, President Reagan signed this new airlift policy and it was issued as National Security Defense Directive (NSDD) 280. It re-emphasized the importance of both military and civil airlift resources in meeting national defense objectives. Its purpose was "to provide a framework for implementing actions in both the private and public sectors that will enable the U.S. efficiently and effectively to meet established requirements for airlift in both peacetime and in the event of crisis or war" (NSDD 280, 1987). This would be

accomplished by several policy guidelines. These included designing policies to strengthen and improve the DOD's airlift capability and enhance the commercial industry, relying on the commercial industry to augment any airlift shortfall in the organic military fleet, procuring additional commercial airlift from CRAF participants to the maximum extent possible, and develop policies and programs to increase CRAF participation (NSDD 280, 1987).

There were several operations that tested the capabilities of the airlift system in recent years. Operations URGENT FURY (Grenada), JUST CAUSE (Panama), and DESERT SHIELD / STORM (Persian Gulf) are just three of these. The last one of these, DESERT SHIELD / STORM, saw the activation of the CRAF (Stage I) for the first time in history in August 1990. Eventually, Stage II would also be activated and the third stage was even considered. General Johnson, former MAC Commander in Chief, said that with DESERT SHIELD, the U.S. was conducting its "largest sustained airlift ever over a short period of time" (MAC Office of History, 1991:200). Operations in the Persian Gulf also showed that air refueling resources are extremely valuable to overall airlift mission accomplishment and set the stage for their future inclusion into a mobility organization.

Lastly, there have been a few organizational changes within the airlift community. In October of 1987, United States Transportation Command (USTRANSCOM) was established as the single manager of the nation's defense transportation system (USTRANSCOM Pamphlet 35-1). This included not only airlift assets, but also sealift and land lift. On 1 April 1992, MAC's single ownership of all airlift assets was ended

when the overseas C-130s transferred to theater commanders. The transfer of remaining C-130 assets from the command occurred the following year; Air Combat Command (ACC) took control of them and airlift doctrine had changed once again. These would revert back to Air Mobility Command (AMC) on 1 April 1997 to allow a seamless mobility system that is refocused on AMC's "essential core:" their airlift mission (Krisinger, 1995:31).

The spring of 1992 also saw the end of MAC as the new Air Mobility Command stood up on 1 June. The move combined the airlift assets of MAC with the air refueling assets of the Strategic Air Command (SAC). It was to be "the lead command for requirements, operating procedures, aircrew training, tactics, standardization and evaluation, and overall fleet management for tanker and airlift aircraft" (Brunkow, 1994:56). General McPeak, in his official activation speech, stated that "We now understand the real requirement is for mobility - that is, deployability and sustainability in combination - and that such mobility will often require a contribution from both the airlift and air refueling communities...It provides the newest, best instrument giving global reach for America" (McPeak, 1992).

III. Planning Considerations

"The national defense airlift objective is to ensure that military and civilian airlift resources will be able to meet defense mobilization and deployment requirements in support of U.S. defense and foreign policies."

- President Ronald Reagan
1987 National Airlift Policy Statement

We have seen throughout history that airlift has become very important to national military strategy and as such, the demand for airlift has increased over the years. In fact, the mission of airlift forces has been coined as moving "Anything, Anywhere, Anytime." The global nature of this statement though, requires an understanding of the air mobility system and the issues that affect the ability to accomplish the mission. Fundamental in this idea is the planning of any or all airlift required for support of the mission. Humanitarian missions, peacekeeping operations, and other contingencies, in addition to the daily training sorties needed, all fight for the scarce airlift resources that exist. Major Murin of the Air Force Doctrine Center recently stated that "there are never enough Air Mobility assets to meet requirements" (Murin, 1996). Therefore, it is essential that planners effectively utilize these airlift resources while accounting for all the factors that drive these decisions. With a very high operations tempo and the dynamic international environment as a foundation, one can see why this could become a very complex task.

Studies done after operations in the Gulf showed that unrealistic planning assumptions and factors were used. Overly optimistic mission-capable rates and

utilization rates caused an improper throughput analysis being developed. Understanding the planning factors, and their underlying assumptions, can help to alleviate this problem in the future. Airlift planning factors, for both military and civilian transport aircraft, can be found in AFP 76-2, which will soon be replaced by AFPAM 10-1403, and AMCR 55-41, although the latter regulation focuses solely on CRAF planning factors. The purpose of this chapter is to better understand the day-to-day operational considerations that go into planning for, and deciding between, the military and civilian airlift assets that exist.

User Requests

Airlift requirements can come from a number of sources, both internal (command personnel) and external (U.S. government, other services, or foreign countries). Supporting the President's travels around the world, transporting Army troops and equipment to a contingency, or delivering supplies to deployed personnel are only a few examples and represent a fraction of the daily demand for airlift that occurs. To ensure these requests are satisfied, there is a thorough process designed and it should be followed. This process, in simple terms, is that these requests go from the user, to USTRANSCOM, to AMC, to the Tanker Airlift Control Center (TACC), and finally to the individual wings or commercial carrier responsible for the airlift. The AMMP-97 defines the following sequence of events:

- USTRANSCOM validated requirements are identified to AMC via the TACC.
- Mission are routed to the appropriate TACC planning cell.

- Validated and prioritized requirements are scheduled by strategic airlift directors, also called "barrel masters", who then task the individual wings. Missions are scheduled based on priority, sensitivity, and urgency.

- The missions are then executed and directed by the TACC until completion. Missions are sometimes changed during execution to respond to unforeseen taskings as aeromedical evacuation, state department requests, etc. These are identified as "in-system selects." (AMMP, 1997:2-11)

Obviously, there are exceptions to this procedure. Many times short-notice mission requirements dictate a modified procedure of some sort. Exercises and training missions (including Joint Airborne/Air Transportability Training (JA/ATTs)) are handled through planning conferences and based on allotted flying time respectively. Other exceptions include Special Assignment Airlift Missions (SAAMs), which will be discussed in the next chapter and Operational Support Airlift (OSA), which is handled by USTRANSCOM.

Unfortunately, there are many factors that impact this process and its success. The environment is basically factors which the planners really have no control over and include such things as weather, natural disasters, maintenance, and political agendas. There are Air Force and DOD regulations that directly affect how cargo and passengers are airlifted. Guidance and policy from the senior leadership provides direction and focus to the decision-making process. This might also involve any tactical deception that is warranted. Numerous information support systems exist that allow for storing of historical data, visibility of the effects of decisions made, and the ability to project future airlift needs. The command and control systems are critical throughout the planning phase to the actual execution of the mission. Without adequate communications capability, a smooth airlift flow is unattainable. Additionally, their presence or absence

may affect the willingness of commercial assets to fly into theater areas (Chenoweth, 1993:43). This was shown to be a problem during the Gulf War because civil transport radios operated on frequencies that were not accessible by military equipment (Gebman, Batchelder, Poehlmann, Vol 2, 1994:50). Finally, the actual operators in the TACC who work the process may interpret these various factors differently, and thus, come up with different solutions to the airlift puzzle.

Possibly the most significant portion of the user request is the Time-Phased Force Deployment Data (TPFDD). It is a detailed database that lists all of the requirements needed for a unit to deploy. Its accuracy is critical to validating and planning the necessary lift required. An inaccurate TPFDD can lead to shifting priorities and lift that must be reallocated. This only complicates the already difficult planning process.

As was stated above, the priority assigned to a mission will determine the way it is planned, scheduled, and executed. This JCS airlift priority system ranges from 1A1, which is Presidential airlift support, to 4B3, which are static displays (See Appendix A). Many times a higher priority mission (one with the lowest number) will "bump," or replace, another one with a lower priority effectively leading to a unfulfilled user request. Obviously, a review of the types of missions will reveal that commercial airlines will not be able to augment many of them. This points out one of the key strengths of military airlift - their flexibility.

Payload

The size of the cargo to be airlifted has a significant impact on the daily airlift decisions made. There are five main categories of cargo loads and they are defined as follows:

- Bulk - Cargo that can be used on 463L pallets (104" by 84" by 96") or in containers and transportable by common cargo aircraft. Also referred to as palletized cargo.

- Oversize - Cargo that exceeds the usable dimensions of a 463L pallet loaded to the design height of 96" but that is equal to or less than 1090" in length, 117" wide, and 105" high. It must fit the dimension requirements of the C-130 and C-141 cargo doors and compartments. Examples of this are Humvees, other trucks, and trailers.

- Outsize - Cargo that exceeds the dimensions of oversize cargo and requires the use of either a C-5 or C-17 aircraft. Examples include M-1 tanks and M-2 infantry vehicles.

- Rolling stock - Equipment that can be driven or rolled directly into the cargo compartment.

- Special - Cargo that requires specialized preparation and handling, such as space satellites or nuclear weapons.

One look at these categories indicates the limitations of commercial aircraft. Most civil transports are designed to maximize their revenue-generating potential in the highly competitive commercial market. Therefore, the aircraft generally have smaller doors, floors constructed of plywood or other lightweight materials, relatively low ceilings in the cabins, low wings, and simple lightweight thrust reversers. All of these design features result in the narrow-body civil transports being more effective for passengers, although freighter-configured transports do have the capability to carry bulk cargo. Additionally, wide-body transports, such as B-747s, DC-10s, MD-11s, and B-767s, can haul most oversize cargo. This difference in design limitations was shown very

dramatically during operations in Southeast Asia where commercial aircraft carried nearly two-thirds of the passengers and only one-fifth of the cargo (Gebman, Batchelder, Poehlmann, Vol 2, 1994:27).

For rolling stock cargo, the KC-135, with its relatively new roller system, is now capable of being utilized to carry small amounts of cargo if needed. This puts them in a similar, yet much smaller, dual-capable role as the KC-10. Furthermore, because of their characteristics, military aircraft are also better suited to carry the special cargo.

Another factor with cargo loads is their shape. The standard pallet size was discussed above; however, each aircraft has a different size cargo compartment that is capable of handling different pallet heights. Narrow-body aircraft, such as the KC-135, DC-8, and B-727, are not capable of handling a 96" pallet height like the C-141, C-5, or B-747. The top of the load must be rounded off on the smaller aircraft to conform to the shape of their individual cargo compartments. Additionally, there are certain positions within many other aircraft, as well as the ones listed above, that require modification to the standard pallet. A pallet already in the system may have to be reconfigured for one of these aircraft to carry the load.

Hazardous materials pose a significant airlift challenge. These materials include such things as explosives, munitions, flammable substances, or corrosive material, such as acids and lyes. Transporting hazardous materials requires special training and handling procedures for loading crews, as well as special flight planning and flying operations by aircrews (Priddy, 1993:98). Additionally, the FAA requires both aircrews and aircraft to be certified to move hazardous materials. Although commercial airlines

carry hazardous materials during contingencies much more frequently than in peacetime, it warrants mentioning here.

There are a few problems that can arise from carrying hazardous materials. One possible hurdle, that arose during the early stages of the Gulf War, is the number of airfields that are capable of supporting hazardous material missions. Often times, military aircraft were cleared to transits airfields with hazardous materials while commercial aircraft were not. Through effective coordination though, these airfields can give their permission. Furthermore, commercial aircrews are not routinely trained to carry hazardous cargo, unlike their military counterparts. Another problem, which is also most prominent with civilian aircraft, is the possibility of having mixed loads on the aircraft; having both passengers and hazardous materials on the same flight. If this is absolutely necessary to complete a mission, waivers can be obtained, although this is certainly not an optimal solution.

Airfield Access and Infrastructure

Without the ability to land at a airfield, it would be practically useless to even takeoff on a mission. Therefore, access to airfields and their existing infrastructure are critical factors in determining what airlift assets should be allocated to a mission. The first element involved with an airfield is its suitability to support airlift operations. This is dependent upon two main factors - political considerations and physical characteristics. Political considerations refer to the willingness of foreign countries to allow use of their

airfields (Gebman, Batchelder, Poehlmann, Vol 2, 1994:145). This willingness could be influenced by such issues as how use of the airfield might affect the country's own military or civil operations or even the effect it might have on the population surrounding the airfield. Noise created by flying operations, increased traffic, and engine maintenance could lead to limited use, or worse, no use at all.

Physical suitability of an airfield depends upon not only the infrastructure of the airfield, but also the type of aircraft that is using the field. The primary airfield infrastructure characteristics that will be discussed involve fuel, ramp space, the runways, material handling equipment, and command and control. Additional issues to be considered include crash, fire, and rescue equipment, hours of operation, navigation aids, customs, landing fees, the altitude of the airfield, and the weather at the airfield.

Availability and allocation of fuel resources can limit an aircraft's access to an airfield. Established airfields would obviously have better fuel resources than many of the locations encountered during deployed operations. Storage capacity may be limited, thereby affecting the number of aircraft able to be refueled. This may lead to aircraft possibly competing for the use of available fuel resources. Each airfield will also have differing capabilities to have their fuel supplies replenished. Furthermore, military transports require different fuel than civilian transports (JP-4 versus Jet A).

The availability of ramp space can also limit access to an airfield. Parking surfaces must be of sufficient size, strength, and durability to accommodate the different sizes, turning radius', and weights of transport aircraft (Gebman, Batchelder, Poehlmann, 1994:147). Large transport aircraft, such as the C-5 or 747, required significantly more

ramp area than the C-130, C-141, or various narrow-body commercial airlines. On the other hand, the C-17 can operate in smaller areas because it has the ability to backup on its own and uses a small turn radius. These differences must be offset with the amount of cargo to be transported into an airfield.

One way to describe the airfield's capacity is maximum aircraft on ground (MOG). Physical MOG is the number of aircraft that can be parked within the limits of the available ramp space, while operating (or working) MOG is based upon the fuel that is available and the number of pieces of material handling equipment and their capabilities.

Runway characteristics, such as length, width, thickness, and composition, attempt to limit airfield access. An aircraft's wing span, engine limitations, and braking ability determine the runway length and width that is necessary for an aircraft to land. The capability of a runway to handle stress and its reaction to aircraft usage is evaluated by looking at the load classification number (LCN). The LCN assigned to a given aircraft depends on its operating weight and weight distribution as well as the runway characteristics. Runway thickness and its composition are the characteristics used to determine the LCN for a given runway. In addition to the weight of the aircraft (including fuel and cargo), other aircraft factors include average wheel loads, tire pressure, and wheel pattern. This information is sometimes referred to as an aircraft's "footprint." Generally speaking, military transports can use shorter runways than civil transports, but their footprint is not necessarily less. For example, although the C-5 has one of the largest payload capabilities, it has one of the smallest footprints and causes the

least stress on a given runway because of its significant number of main gear wheels. This enables them to distribute the load over a greater area. All this information, for airfields in both the U.S. and foreign locations, can be found within the Airfield Suitability Report database.

Material handling equipment (MHE) provides the foundation for the support of any airlift system. Without capable MHE, cargo cannot be loaded onto an aircraft. The current capabilities of MHE are dependent upon several types and models, such as the 25K, 40K, and 60K loaders. Commercial wide-body transports generally require the larger loaders because of their capability to reach the higher doors. Most military are designed to allow more rapid onload and offload capability. The bottom line is knowing what type of MHE is available, how many are at a location, and their capabilities, will determine what type of transport can be utilized at an airfield.

The command and control structure at an airfield allows the airlift to occur. Moving cargo and personnel across the airlift system by utilizing different transports requires effective command, control, and communications (C3). Radio frequencies must be published and usable by all possible transports, both military and civilian. Arrivals need to be coordinated to ensure a smooth transition with onload or offload operations. Command and control structures must also be able to effectively utilize the available resources at a given location to exploit the capabilities of a particular type of transport aircraft. Knowing what loads are required and the capabilities of aircraft can potentially increase the airlift moved through an airfield when the inevitable changes occur. Permanent C3 elements can normally provide a wider range of objectives; however,

deployable assets like the Tanker Airlift Control Elements (TALCEs) are very capable in meeting the needs of airfield operations.

Availability of Airframes

The changing international threat and subsequent shift in our national security strategy has increased the demands on the available airlift assets. To determine the force structure, including airlift requirements, the Mobility Requirements Study Bottom-Up Review Update (MRS BURU) was completed. The resulting mix of military and civilian airlift resources is being tasked at a very high operations tempo and doesn't seem to have an end in sight. Often times the only transport option is to choose whatever airlift asset happens to be available at the time (Kirkendahl, 1996).

One method which TACC uses to define the availability of military airlift assets is their commitment rates. These rates are based on the number of primary aircraft inventory for each base and equate to the number of aircraft available for missions on a daily basis, excluding those necessary for training. Currently the C-5 is tasked to 65 percent, 75 percent for the C-141, 80 percent for the C-17 and KC-135, and 85 percent for the KC-10 (Peck, 1997). Commercial assets are presently used as the primary method to move passengers, leaving military transports to handle the majority of cargo on a day-to-day basis.

One significant issue with availability is the number of both aircraft and personnel that are part of the Air Reserve Component (ARC). The ARC is composed of the Air Force Reserve (AFRES) and Air National Guard (ANG) forces and currently comprises

nearly 50 percent of AMC's total force. With respect to airlift assets, the majority of C-5, C-141, and KC-135 aircrews now reside in the ARC (AMMP, 1997:3-7). As the drawdown of the C-141 fleet takes place, the ARC will increase its portion of the total C-141 force. The implications of the ARC contribution concerns the individuals who man the aircraft. In the majority of cases, ARC personnel have civilian jobs outside of their military commitments. Therefore, the availability of these individuals is of primary concern to the airlift planner. Unless the ARC is activated, there is no requirement for them to fly if it would negatively affect their primary job. Historically though, the ARC does provide over 25 percent of the strategic airlift on a daily basis (AMMP, 1997:3-9).

Training and Mobility Requirements

Mobility readiness has its foundations in the training accomplished by aircrew members everyday. This training is based on AMC's flying hour programs, which are the minimum number of hours needed to fly during peacetime in preparation for war, and it flows from the National Airlift Policy:

> The goal of the United States government is to maintain in peacetime organic military airlift resources, manned, equipped, trained, and operated to ensure the capability to meet approved requirements for military airlift in wartime, contingencies, and emergencies. (Waters, 1996)

It is the responsibility of the TACC to monitor the flying hour program to ensure that hours allocated are flown; if not, then make adjustments as necessary. Misallocation could result in an individual flying unit not being trained to the required levels. The goal is to maintain aircrews and aircraft in a constant state of readiness and training is the method by which this accomplished.

Aircrews are trained by providing airlift missions to customers who pay for them through what was previously called the Defense Business Operating Fund - Transportation (DBOF-T), but is currently undergoing a name change to the Transportation Working Capital Fund. As a result, AMC relies heavily on this airlift business to help finance a large part of the flying hour program (Waters, 1996). This fund then, in effect, provides dollars for both AMC readiness training requirements and DOD transportation needs. Therefore, the flying hours available should be utilized, to their maximum extent, for training AMC personnel. Aircrews must be sufficiently trained and adequately experienced to successfully meet requirements. This, in turn, will require less commercial augmentation to satisfy the overall airlift demand.

Unfortunately, there are problems with the way transportation costs are calculated; therefore, the user does not understand the true costs of their requests. General Rutherford, former Commander of Air Mobility Command, stated "The problem with DBOF to date has been the sorry state of DOD accounting systems. They are so bad that we don't know what things cost. Never have." (Matthews and Cossaboom, 1996:18). This brings up an interesting point. If costs for airlift are ever correctly calculated and the resulting amount of money in the DBOF-T decreases, the effects on the flying hour program could be substantial, possibly devastating to the training of aircrew members. Furthermore, although the cost to the military of contracting commercial airlift is relatively inexpensive, this is not true for costs charged to the user. The bottom line is that neither the military or the user are comfortable with the costing system that currently exists.

Delivery Time Performance / Reliability Rates

The ability to deliver the passengers or cargo when it is desired is another factor in deciding which airlift resource to schedule. The individual capabilities of military and civil transports will be covered later; therefore, this discussion will be limited to the reliability rates of the various aircraft.

The average age of military aircraft has been steadily increasing over the years. In FY95, this average age was 17.8 years for active-duty aircraft, 18.4 years for the Reserves, and 15.9 years for the Guard (AFI 65-203, Table E-15). Logically, this would mean that the reliability of these aircraft will also begin to decrease. In his oral history, General Rutherford believed that the military had become comfortable with reliability rates below 70 percent and that this complacency would lead to even lower rates. However, he also felt that improvements were being made and said that his comfort level would be "90 percent across the board" (Matthews and Cossaboom, 1996:37). A recent review of these rates though does not look promising.

TACC completes a mission delay report to aid senior leadership in decision making and policy modification. It utilizes information from the AMC history system to show data for the previous 24 hours and the previous 30 days of both military and commercial mission reliability. The numbers from a 12 April 1997 message are very revealing. In the 24 hours prior to the message: C-141 - 80 percent, C-5 - 78.3 percent, C-17 - 100 percent, C-130 - 89.1 percent, KC-10 - 88 percent, KC-135 - 91.1 percent, and Commercial - 96.3 percent. The 30-day numbers were: C-141 - 79.6 percent, C-5 - 70.1

percent, C-17 - 85.8 percent, C-130 - 89.3 percent, KC-10 - 85.3 percent, KC-135 - 87.7 percent, and Commercial - 95.5 percent (TACC message, 1997). A review of these figures shows that commercial transports, in nearly every case, are more reliable than military transports, sometimes significantly.

An analysis of DOD's shipment performance shows that a dismal 17 percent of the highest-priority shipments in the U.S. meet the standard of five days. Furthermore, more than one-third of the lowest-priority overseas shipments took longer than the maximum standard (Halliday and Moore, 1994:4).

Meeting the customers' expectations is paramount to establishing credibility and dependability throughout both the command and the actual users of the airlift system. The figures listed above seems to suggest that a problem exists somewhere in the whole airlift pipeline (supply, spares, etc.), not just with the aircraft themselves. Where the bottleneck is however, is very difficult to determine. The other downside of these facts is that training is being lost due to the unreliability of military aircraft. In this era of shrinking budgets, any loss of training could be potentially harmful.

Mission Planning Constraints

When a airlift requirement is determined, there are several mission planning constraints that must be looked at before deciding on the appropriate airlift resource to commit. Such issues as critical leg length, enroute base availability, air refueling, and diplomatic clearances required affect the choice of aircraft.

As was mentioned before, there is a trade-off between the payload that is required and the distance a given transport aircraft is capable of flying. As payload increases, the amount of fuel that can be carried decreases and both of these factors combine to decrease the range an aircraft can travel. Therefore, the critical leg length, which is the leg that is most restrictive, must be examined. Included in this analysis must be the influence that winds will have during the route. Obviously, headwinds will decrease the range an aircraft is capable of flying. Any errors in calculating the critical leg length, or wind, can yield large errors in the calculated payload and, therefore, the choice of aircraft (Gebman, Batchelder, Poehlmann, 1994:92). Generally speaking though, commercial transports are capable of traveling longer distances than most military transports because of their inherent fuel-saving design features.

The same reasons discussed above also apply to the constraint of enroute base availability. The unavailability of landing bases, whether it be for weather, an actual lack of bases, or any other access issue, will force an aircraft to fly longer distances before its mission is complete. Once again, the longer the distance, the more attractive civilian transports become as an option. One way to improve the feasibility of military aircraft is by utilizing air refueling.

Air refueling has increasingly become a significant part of the airlift system. It increases the range of military transports allowing them to carry larger loads over greater distances. Some studies show that throughput rates could potentially increase by as little as 6 percent or by as much as 30 percent. A 1994 RAND study showed that "aerial refueling yielded almost a one-third increase in the amount of cargo that the military-style

transports could deploy to Southwest Asia" (Gebman, Batchelder, and Poehlmann, Vol 2, 1994:106). It could also provide some protection against the possibly of the limited availability of en route bases. Additionally, the elimination of en route stops will reduce mission-cycle times (i.e. reduced wear on systems used during takeoff and landing). Unfortunately, the downside to these benefits are that they may be outweighed by the significant expense of air refueling.

The inability to obtain required diplomatic clearances could force a restructuring of a mission profile and, as a result, the best possible airlift for the mission. Dip clearances, as they are often referred to, can take a lot of time to get, and delays could cause a ripple effect throughout the airlift system.

Airlift Capabilities

Once all of the various factors concerning airlift planning have been looked at, estimates of the strategic airlift capability can be computed. These estimates help in determining how many tons of cargo per day can be transported to a given theater. The figures used are the number of aircraft, block speed, average payload, utilization (UTE) rate, and a productivity factor. These are all multiplied together and divided by the one-way distance to arrive at the tons per day.

The value used for the number of aircraft is different for each aircraft type being utilized and will cause multiple tons per day to be computed. Block speed is the aircraft's average speed over a given distance from takeoff to block-in. Average payload equates to the average number of tons over a given distance and is taken from published range-

payload charts from AFP 76-2. The tradeoffs of this relationship have already been discussed. The UTE rate is the average number of hours per day each primary aircraft inventory flies, both during surge and sustainment periods (AMMP, 1997:1-23). Many of the considerations discussed above affect the UTE rate. Finally, the productivity factor reflects the nature of round trip flights by accounting for repositioning legs to onload bases. This figure varies with distance.

One important point to remember is that these factors may be different for peacetime or wartime. Planners must take precautions to select the correct numbers from the tables when calculating airlift capability.

Special Assignment Airlift Missions

Many times a channel, which is the routine airlift the Air Force conducts between locations in peacetime, does not adequately meet the needs of the user. It is for these situations that Special Assignment Airlift Missions (SAAMs) were designed to accommodate. They are user funded requirements requested because of the unusual nature of the cargo, sensitivity/urgency, or operations to airfields other than those normally transited by AMC aircraft (AMCI 11-206, 1996:19). SAAMs are a service, not aircraft, option provided for the exclusive use of an agency that meet special pick-up and delivery considerations (Newton, 1996). They are susceptible to the same mission constraints and planning factors that were discussed above; however, they are much more expensive than normal airlift missions. Therefore, planning must be done carefully and

the user needs to be informed of the associated costs so he does not suffer "sticker shock."

IV. Issues Involved in CRAF Utilization

Airlift planning in a peacetime environment involves a myriad of considerations that have already been discussed up to this point and a large part of this planning involves CRAF assets. However, there a number of additional factors affecting CRAF that arise in crisis situations. As was stated before, the CRAF comprises a significant portion of total airlift capacity. With the budgetary constraints currently being placed on the military, this portion has the potential to increase even more. Therefore, issues affecting the utilization of CRAF resources in contingency situations warrant further discussion. Airlift planners must be aware of these additional considerations when selecting between airlift resources.

CRAF Activation

In times of increasing demands on the airlift system, the capability exists to "activate" stages of the CRAF to augment the military's airlift capabilities. If called upon, the civilian air carriers, that have voluntarily committed their transports, will fly passengers and cargo as directed to support airlift requirements that exceed the capabilities of organic aircraft. The Commander in Chief, USTRANSCOM, with approval of the Secretary of Defense, can activate all stages of the CRAF. There are three stages and are defined as follows:

- Stage I - Committed Expansion. Due to an increase in airlift requirements. Consists of long-range international aircraft to support shortfalls in channel traffic that military airlift cannot support. Aircraft committed to this stage are

also included in the other stages. Crews and aircraft must be at the designated onload site within 24 hours of mission notification.

• Stage II - Defense Airlift Emergency. Consists of airlift capability identified for an airlift emergency not warranting national mobilization. The emphasis is still on long-range international aircraft. Crews and aircraft report for duty within 24 hours of mission notification.

• Stage III - National Emergency. Full mobilization of the CRAF may occur if required for DOD operations during major military emergencies involving U.S. forces. SecDef orders USCINCTRANS to activate this stage in time of war or during a defense-oriented national emergency declared by the President, or in time of a national emergency declared by Congress. Crews and aircraft have 48 hours to report to the designated onload site. This increased time accounts for the larger number of aircraft involved. (Coffey and Frola, 1996:A-2,3 and Priddy, 1993:7)

For the first 38 years of CRAF's existence, it had never been activated. The commercial industry had always volunteered their services when the military had fallen short of airlift capacity. However, the airlift that was predicted to occur during the Gulf War was not going to be met by a combination of military aircraft and these voluntary commercial assets. Consequently, in August of 1990, Stage I of the CRAF was activated for the first time in its history. Six months later Stage II was activated. Stage III activation was considered; however, political pressures from the passenger airline industry coupled with the potential economic impact, kept this from happening. These historical facts are not the only issue though. The effect on the commercial airline industry and the economy, should Stage III ever be activated, would be substantial.

The civil transports used for CRAF participation come from the fleet of aircraft that are used for the day-to-day operation of the airline industry. Any use of these aircraft for contingencies will deplete the resources available for the nation's passenger and cargo service. In fact, full Stage II activation represents one fourth of the industry's passenger

capability and almost half of the industry's cargo capability. For full Stage III activation, these numbers increase to nearly 50 percent and 60 percent respectively (Coffey and Frola, 1996:4-7). Therefore, the implications of using the CRAF are considerable.

One significant issue is the resulting loss of revenue and potential loss of market share that could occur. Each airline has its own level of financial stability, cost structure, excess capacity, and market share. Furthermore, the level of participation varies between airlines. Consequently, activating Stage III will have a different effect on each airline. For some airlines, this could be devastating. For example, if an airline had a profitable commercial service prior to activation, the loss of assets could cause financial losses. Additionally, activation cause an airline's infrastructure - reservation clerks, baggage handlers, and delivery trucks - to remain idle or underutilized and unfortunately, AMC does not account for this in its uniform rate calculations (Coffey and Frola, 1996:3-19). Loss of market share could be particularly affected because leisure travelers tend to fly with the airline offering the lowest fare. They generally do not form long-term relationships with individual carriers. In fact, these concerns led both American and United Airlines to almost completely drop out of the program after the war (Coffey and Frola, 1996:1-2).

Another issue is the affect that activation would have on the nation's economy. Organizations around the world have come to depend on air cargo in the conduct of their business operations and they would definitely be affected as more stages are activated. Additionally, the aircraft available for passenger traffic would decrease thereby affecting the ability of the general public to utilize the airline industry for their travel needs.

The issue of crew availability presents an interesting problem. The participants in the CRAF are required to have a 4-to-1 crew ratio, meaning four crews per aircraft. However, these individuals cannot have a reserve commitment (i.e. ARC personnel), nor can they be foreign nationals. One caveat is that this restriction applies only to front-end aircrew members, not those in the rear of the plane, such as flight attendants (Van Horn, 1997). What this implies is that if any ARC personnel are called upon to fulfill their military duties and they also work for the airlines, only that portion of an airline which is not committed to the CRAF will be affected. Consequently, the airlines will lose some of their capability to fly the day-to-day passenger and cargo requirement, not the capability to support their CRAF commitments.

A final issue concerns flight time limitations. There are FAA regulations that limit the number of hours an aircrew member is allowed to fly per flight as well as per monthly and quarterly periods. If these limits are reached or exceeded, the number of pilots that are available to fly will decrease. During the Gulf War, the FAA agreed to grant waivers so that the crews could continue flying as necessary.

Should the CRAF ever be activated again during any future contingency, airlift planners must take these considerations into account in order to ensure the airlift will be available to meet increased demand.

Insurance

The inclusion of commercial transports in contingency operations must address the question of insurance coverage for these civil missions. Unless some sort of coverage

is provided to a carrier and its crews, the aircraft will not be able to fly. They are essential for CRAF operations in contingency operations and "allow for a smooth transition from peacetime to wartime conditions. Without them, there is little doubt that most carriers would have refused to fly national security contingency support missions, regardless of whether CRAF was activated or not" (Priddy, 1193:219).

The government has two methods of providing coverage: the FAA insurance program under Title XIII of the Federal Aviation Act of 1958 and indemnity coverage under Public Law (PL) 85-804 (Matthews and Holt, 1996:82-3). Title XIII insurance, now referred to as Chapter 443, is issued to foreign or domestic carriers for operations conducted in the national interest. This insurance can be offered as a premium policy for regularly scheduled commercial service or charter service where the government is not the contracting agency (Priddy, 1993:203-4). Nonpremium policies are issued for government-contracted aviation operations. PL 85-804, on the other hand, is not an insurance program, but an indemnity program. It is designed to protect contractors from unusually hazardous conditions that commercial underwriters will not insure.

Since the Gulf War was the first time the CRAF was activated, problems with insurance coverage were inevitable. Paperwork was very cumbersome. Rates during the initial stages of the build-up made flying to the region almost cost-prohibitive. Certain flights were not covered and there were gaps in the limits of liability. Further, the indemnity fund lacked sufficient resources to pay for even a single claim arising from an accident that occurred (Priddy, 1993:218).

Two of the most significant problems for the commercial airline industry though. The first issue concerns the payment of life insurance benefits for crew members in wartime conditions. Unlike coverage for military personnel, which pays even in wartime conditions, policies on commercial pilots required higher premiums for this type of coverage. Second are the delays in payment for claims filed by an airline. Many airlines do not have the cash flow do cover operations while waiting for payment.

According to Ron Van Horn of the CRAF office at HQ AMC, the years since DESERT SHIELD and STORM have allowed both the military and the commercial industry to work out these issues fairly well. The indemnity fund has stabilized somewhat financially. Furthermore, the Air Force will now cover any losses caused by problems with either aircraft or crews if the FAA cannot pay (Van Horn, 1997). Although, progress has been made, planners must keep abreast of these insurance issues when deciding to use CRAF resources.

Possible Threats

Although there are inherent dangers involved with any type of flying operation, even in a peacetime environment, these tend to increase in crisis situations. Risks such as terrorism, chemical attacks, and missions into combat areas greatly affect the choice of airlift. This points out a fundamental difference between military and civil airlift - civil air carriers cannot force their employees to fly into harm's way while the military has the ability to control their airlift assets in any environment. The military trains everyday to prepare for operations in a hostile environment or the possibility of landing at austere

airfields with little, or no, support available. Additionally, many military aircraft are designed with defensive equipment to operate in adverse environments. Lieutenant Colonel Owen, in his article "The Airlift System: A Primer," described this as the second tenet of airlift policy: "The role of the military component of the airlift fleet is to do what commercial transport aircraft or civilian aircrews cannot or will not do" (Owen, 1995:25).

The Gulf War experiences highlights some of these issues. The threat of chemical weapons forced everyone transiting the theater to be equipped with protective gear, but in the early stages of the conflict, commercial aircrews had some difficulty is obtaining this gear. Furthermore, they are not routinely trained in its use, unlike military aircrew personnel. When the Scud attacks began, not only did many aircraft divert on their own, but several carriers refused to permit their aircraft to fly into the area, especially at night when most of the attacks occurred (Lund, Berg, and Replogle, 1993:29).

The effects that these issues present must be considered by airlift planners early in the planning process. If not, delays in delivering cargo or passengers may occur. Due to the existing threats, the number of airlift resources actually available on a daily basis may decrease or the schedule may need adjustments to account for the reservations of civil air carriers (i.e. fly only during daylight hours). The bottom line is that CRAF aircrews should not be expected to accept the same hazards as military aircrews; they are not primarily trained to operate in these environments.

V. Recommendations and Conclusions

Since the end of the Cold War, the world in general, but more specifically the Air Force, has changed rather dramatically. The policy of containment that guided strategic thinking went away and a new national security strategy was developed. Forward basing gave way to forward presence and troops were brought back to the United States. However, our interests around the world did not change; in fact they became more diverse. To defend these interests, the U.S. must be able to "provide a rapid response capability to deliver and support its forces as needed to meet military and humanitarian crises" (USTRANSCOM Pamphlet 35-3, 1996). This capability is being met through the use of airlift.

Unfortunately, with shrinking budgets and the ever-changing international environment, the airlift capacity of the military is being stretched to its limits. The organic force structure of air mobility assets must work in concert with those of the civil air industry to handle the demands being placed on the airlift system. Planning for this airlift, then, requires a thorough knowledge of the issues that affect this airlift system. These issues involve numerous overlapping factors that affect the airlift resource selected for a given mission. Even 30 years ago, General Estes, Commander of MAC, realized the constraints on airlift identifying nine of them: "speed, range/payload trade-off, flexibility of employment, cubic capacity, loadability, self-sufficiency, terminal base requirements, fuel dependency, and direct operating costs" (Miller, 1988:345). Although these

constraints may have changed somewhat since then, they certainly resemble the current planning factors in many ways.

Future Issues and Recommendations

So what does the future hold and how will this affect airlift planning decisions? First of all, the health of the strategic airlift fleet is a major concern for the command. The C-141s will be retiring from service in less than ten years. Although the C-17 is an extremely capable airlift resource, the 120 scheduled for purchase will not be able to adequately fill the void left by the loss of the C-141. If demands on the airlift system continue to be significant, this will cause more reliance on the commercial industry to augment any airlift shortfalls. For the planner, there will be less aircraft from which to choose, making selection decisions more challenging.

Whatever the size of the airlift fleet, they must be able to meet two basic needs: the capacity to respond to major needs and the flexibility to adapt to a variety of airlift circumstances (Gebman, Batchelder, Poehlmann, Vol 1, 1994:62). Each transport, whether they be military or civil, must be evaluated on their own individual merits. There are distinctive benefits to each; planners must peel back the "layers of the onion" to understand what is behind the numbers that define their capabilities and limitations and utilize this information to arrive at a selection decision.

The uncertainties of the global economy may affect the willingness of airlines to participate in the CRAF. Additionally, there is a continuing trend in the commercial airline industry away from large transports, like the 747, towards smaller aircraft that give

the airlines more flexibility in providing services to their customers. Both of these factors could potentially reduce the resource pool even more.

The feasibility of having a Stage III also needs to addressed. As stated earlier, activating Stage III could have a devastating effect on both the economy and the airlines themselves. Shortly after the end of the Gulf War, AMC acknowledged that Stage II is probably the maximum level of activation under today's contingency scenarios (Coffey and Frola, 1996:3-4). The question begs to be asked then: If the potential effect of activating Stage III is substantial, but the possibility of activating it is minimal, then why even have a Stage III?

Although the CRAF is relatively healthy right now, improvements are progressively being made in the civil/military relationship, and many airlines have come back to the CRAF or increased their participation, continued incentives for CRAF participation are mandatory, along with an examination of the implications of activating CRAF stages, to ensure the airlift capability they provide will not diminish.

Second, current planning factors must be relooked at to arrive at feasible and realistic estimates. Accurate reliability rates, obtained from studying actual historical information, must be used for planning purposes. Valid TPFDDs must be supplied to the planners early enough to ensure adequate lift is available. The number of airfields that can accommodate airlift aircraft, especially the C-17, must be assessed. The DOD has not identified enough austere airfields that the C-17 could use in a contingency.

Third, the infrastructure that supports the airlift system needs a facelift. The current MHE is unreliable and very expensive to maintain. Additionally, it cannot reach

the cargo doors of many of the commercial wide body aircraft. The 60K loader that provides this capability was not funded in the most recent budget. Modernizing MHE is crucial. Without adequate MHE, the use of larger transports will not be possible, and therefore, affect the amount of cargo that can be moved worldwide.

A final issue that affects planners is the cost of airlift. The cost of flying hours do not account for all the factors that go into them. If the users are not provided with accurate cost data, they cannot determine their airlift needs. Accurate cost figures must computed based on the activities it takes to accomplish airlift missions.

Conclusion

Early attempts at airlift ran into numerous obstacles because combat force were the focus. As a result, airlift pioneers wanted to form under a single command thereby increasing the numbers of transports. Their vision and drive provided the impetus for the numerous advancements in the mobility arena, enabling airlift to become the instrument of national security strategy that it is today. As the Air Force prepares to enter the 21st century, the dynamic global environment will continue to present challenges for the military and commercial transports that furnish airlift to users around the world. General Fogelman expressed this belief in his "Global Engagement" speech: "Our airlifters and tankers are important today and they will continue to be so in the future. They give the National Command Authorities the ability to reach out and influence events around the world" (Fogelman, Washington DC, 1996).

Where do we go from here? The Quadrennial Defense Review (QDR) is an assessment of DOD strategies, force structure, and modernization programs to determine the future course of action the military will take. It is the next step from the MRS BURU study that drives the current military strategy. Other strategic vision statements like "Global Engagement: A Vision for the 21st Century" and "Joint Vision 2010" are intended to shape the ideas about what the Air Force will provide the nation. Changes in both the military and the environment will continue to provide airlift planners with the opportunity to prove themselves as the critical link between mission success and failure for many years to come.

APPENDIX A: JCS Airlift Priorities

1A1 Presidential-directed missions
1A2 Forces or activities in JCS-designated combat
1A3 Programs approved by the President for top national priority
1A4 Special weapons

1B1 OSD or JCS directed missions
1B2 JCS-approved units, projects, or plans
1B3 Validated frequency channels

2A1 Forces or activities deploying or positioned and maintained in readiness for immediate combat, direct combat, or direct combat support
2A2 Industrial production activities for repair, modification, or manufacture of primary weapons, equipment, and supplies, to prevent work stoppage or to reinstate production

2B1 JCS-directed exercises
2B2 JCS-coordinated exercises

2C1 Air Force ORIs requiring the use of SOLL-II
2C2 Special ops forces training in support of and validated by COMJSOC
2C3 Fenced JA/ATT

3A1 Readiness or evaluation tests in support of unit inspection or evaluation tests
3A2 Forces or activities in state of readiness to deploy for combat or activities essential to combat forces
3A3 Requirements channels

Unfenced JA/ATTs in support of:
3B1 Service training integral to combat readiness
3B2 Combat support training
3B3 Service schools requiring airborne, airdrop, or ATT
3B4 Airdrop, ATT, or aircraft certification of new or modified equipment

4A1 Forces or activities tasked for employment in support of approved war plans and essential support activity for these forces
4A2 Static load exercises for units with air transportability missions

4B1 Other forces or activities
4B2 Other non-DOD activities that cannot be accommodated by commercial airlift
4B3 Static display for public or military events

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VITA

Major Christopher J. O'Dell was born on 28 July 1960 in Hamilton, Ohio. He graduated from Colerain High School in 1978 and entered undergraduate studies at Miami University in Oxford, Ohio. He graduated with a Bachelor of Science degree in Business in May 1982. He received his commission on 5 April 1985 upon graduation from Officer Training School. On 31 October 1985 he earned his navigator wings.

After KC-135 navigator training at Castle AFB, California, he was assigned to Loring AFB, Maine, where he served as an instructor navigator and worked in training flight until the summer of 1989. His next assignment was to Grissom AFB, Indiana where he flew as an instructor navigator on both the KC-135 and the EC-135. He also worked as a wing scheduler and temporarily served as squadron Operations Officer.

After being selected on the initial crossflow board, he went to Altus AFB, Oklahoma for C-141 training. He then moved to McChord AFB, Washington, where he served as Flight Commander, Training and Tactics and Airlift Director. While at McChord AFB, he earned a Master of Science degree in Human Resource Management from Chapman University.

In January 1996, Major O'Dell was assigned to the Air Mobility Warfare Center as a Student, Advanced Study of Air Mobility (ASAM) program. After graduation, he will be assigned as Chief, Special Operations Exercises, J-3 Directorate, HQ USEUCOM, Germany.

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